e : 1) All questions are compulsory.
2) Draw diagram wherever necessary.
3) Figures to the right indicate full marks.

a) Fill in the blanks with appropriate answer from the given alternatives (Any four) 4

1) Synthesis of new DNA take place in the _____ direction. (5' to 3', 3' to 5', 4' to 5')
2) In Messelson and Stahl's experiment _____ is the heavy isotope used as nitrogen source in growth medium for E.coli (^{14}N, ^{15}N, ^{13}N)
3) The new DNA strand being made in the 5' to 3' direction same as movement of the replication fork is called the _____ strand. (leading, lagging, template)
4) DNA replication takes place in the form of _____ type of replication. (semi conservative, conservative, dispersive)
5) _____ enzyme is a form of topoisomerase which relaxes the tension produced in the DNA a head of the replication fork. (Gyrase, Helicase, Amylase)
6) DNA polymerase I removes RNA primer with its _____ activity (5'–3' exonuclease, 5'–3' polymerase, 3'–5' polymerase)
7) To synthesis DNA the initiation of DNA chain is carried out by using _____ primer. (DNA, RNA, double stranded DNA)
8) _____ enzyme is used to untwists the DNA to produce single stranded template strand. (Helicase, Polymerase, Amylase)

b) Explain (any two) of the following terms. 4

1) Okazaki fragments
2) Conservative DNA Replication
3) Unidirectional DNA Replication
4) Dispersive DNA Replication

c) Answer (any two) of the following. 12

1) Explain Looped Rolling Circle Model of DNA replication.
2) Explain Bidirectional DNA replication.
3) Explain Messelson - Stahl experiment.
4) Explain the process of Initiation of DNA replication in E.coli.

Q. 2 a) State whether the following statements are True or False (Any two). 2

1) In depurination a purine, either adenine or guanine is removed from the DNA.
2) DNA polymerase removes wrong nucleotide by its exonuclease proofreading activities.
3) A common base analogy mutagen is 5-bromouracil.
4) Photo reactivation occurs when and enzyme called amylase is activated by a photon of light.

b) Explain (any three) of the following terms.

1) Somatic mutation
2) Germ line mutation
3) Induced mutation
4) Frame shift mutation
5) Silent mutation
6) Reverse mutation

c) Explain (any two) of the following.

1) SOS Response
2) Repair by Methyl - Directed mismatch repair
3) Mutation caused by Base analog mutagen 5-Bromouracil
4) Mismatch repair by DNA polymerase proof reading activity

Q. 3 a) Define the terms (Any two).

1) Pedigree analysis
2) Linked genes
3) Heterokaryon
4) Syntenic genes

b) Give symbols used in pedigree for (any four) of the following.

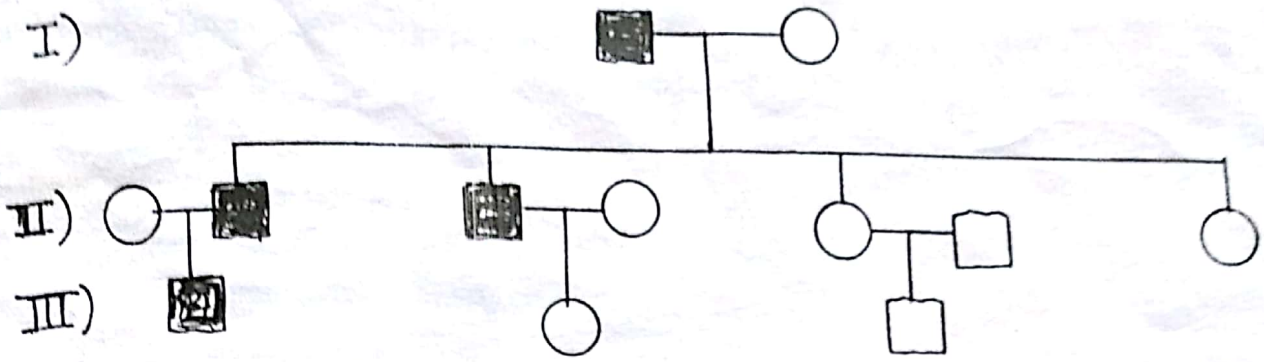
1) Mating
2) Normal female
3) Male
4) Death
5) Monozygotic twins
6) Carrier female
7) Proposita
8) Dizygotic twins

c) Attempt (any two) of the following. **12**

1) Describe the formation of PD, NPD and TT tetrads at four strand chromatid stage for linked genes.
2) How will you establish gene order using a three point cross, explain with a suitable example.
3) Solve : A Neurospora strain that required argenine (arg) but can synthesize methionine (met+) for growth was mated to a strain (arg+ and met) following products was obtained. Compute the gene and centromere distance for the two genes.

	1	2	3	4	5	6	7
Spore pair 1	arg +	arg met	arg met	arg +	arg +	arg met	arg met
Spore pair 2	arg +	arg met	arg +	+ met	+ met	++	arg +
Spore pair 3	+ met	++	+ met	arg met	arg +	arg met	+ met
Spore pair 4	+ met	++	++	+ +	+ met	++	++
	45	10	10	5	15	5	10

4) Observe the following pedigree and answer the following questions.



i) Which individual is the proband?

ii) What is the mode of inheritance?

iii) What is holandric trait?

iv) What are the characteristics of the condition hypertricosis?

v) The hormone found in males for expressing secondary sexual characteristics?

vi) What is hemizygosity?

Q. 4 **Write short notes on (any three) of the following.** **15**

1) Life cycle of Neurospora crassa
2) Importance of pedigree analysis
3) Thymine dimmers.
4) Role of DNA polymerase III during DNA replication.
5) Sigma mode of DNA replication
6) Physical and chemical mutagens.

—— The End ——